OIPE JC81
JUN 2 1 2004
PATENT & TRADEMARK OFFICE

AF/2631

PATENT
Docket No. 44912009400

CERTIFICATE OF HAND DELIVERY

I hereby certify that this correspondence is being hand filed with the United States Patent and Trademark Office in Alexandria, VA on June 21, 2004.

Stephanie R. Mason
Stephanie R. Mason

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Patent Application of:
Paul W. BAIER et al.

Application No.: 09/889,518 — Art Unit: 2631

Filed: August 27, 2001 — Examiner: K. Tran

For: METHOD FOR OBTAINING INFORMATION REGARDING INTERFERENCE IN THE RECEIVER OF A MESSAGE TRANSMISSION SYSTEM

RECEIVED
JUN 2 4 2004
Technology Center 2600

APPEAL BRIEF

MS APPEAL BRIEF-PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This is a timely appeal from the final rejection dated October 21, 2003.

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is Siemens Aktiengesellschaft.

06/23/2004 HVUONG1 00000023 031952 09889518
01 FC:1402 330.00 DA

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences within the meaning of 37 CFR 1.192(c)(2) known to appellant or counsel.

III. STATUS OF CLAIMS

Claims 1-5, 8-13, 16-22 and 27 (shown in the Appendix), which are under final rejection, are the only pending claims in the application.

Claims 1-2, 17 and 27 are finally rejected under 35 USC 102(e) as anticipated by Smith; claims 3-5 and 18-20 are finally rejected under 35 USC 103(a) as unpatentable over Smith in view of Van Heeswyk, and claims 8-13, 16, 21 and 22 are finally rejected under 35 USC 103(a) as unpatentable over Smith in view of Raleigh.

IV. STATUS OF AMENDMENTS

An Amendment under 37 CFR 1.16 was filed March 22, 2004 and an Advisory Action was issued on April 13, 2004 indicating that the amendments would not be entered for the purposes of the Appeal.

V. SUMMARY OF THE INVENTION

The present invention relates to a receiver which has at least one receiving antenna. The receiver receives a signal (referred to as the "received signal"). This signal is similar to the user signal (modified by a system matrix which describes distortions of the signal during radio transmission through the air) plus the interference. This is shown by formula (12) in the description and the corresponding explanations regarding formula (12).

Formula (12): $e = A*d + n$, where e is the received signal, d is the user signal and n is the interference signal. A is the system matrix.

The claimed invention uses three different expressions:

- "received user signal" which corresponds to "d" in formula (12). The user signal is a signal aimed at the receiver but not known by the receiver, i.e. the user signal equals data or signaling information for the receiver, the content of which the receiver needs or wishes to know. The fact that the user signal equals information which is not known to the receiver can be seen in the description (referring to the English translation of the German version before amendments):

P. 8,1. 11-16: "The transmitted bursts consist of two data blocks and a midamble arranged between them which provides for the channel estimate at the receiver end. In the text which follows, only the first data block of a burst will be considered in the description of the data detection." The "data blocks" are the same as the user signal, the midamble (which is known by the receiver) can be used to obtain quantitative information about the data blocks. Further, P. 8,1. 28-30: "e contains all samples of the received signals at all Ka antennas which are based on the first data block of the transmitted burst."

- "received interference signal" which corresponds to "n" in formula (12).
- "received signal" which corresponds to "e" in formula (12).

The invention, with reference to the expressions described above, works as follows:

- First, the received signal (e) is used to obtain quantitative information about the received user signal (d). An example how this can be done is given by formula (14) of the description. Here, the quantitative information about the received user signal is called “estimate.”
- Second, quantitative information about the received interference signal (n) is obtained using the received signal (e) and the result of the first step, namely the quantitative information about the received user signal (d). An example how this can be done is given by

formula (16) of the description. Here, the quantitative information about the received interference signal is called "estimate."

Third, the result of the second step, namely the quantitative information about the received interference signal (n) is used to generate a directional pattern, which is used by the receiver to transmit signals. The directional pattern therefore is not (or at least not only) generated in order to better decode to-be received signals, but to transmit signals in certain directions. The aim of this procedure of generating the directional pattern for transmission is to reduce interference caused by the wireless station we are looking at to other wireless stations.

VI. ISSUES ON APPEAL

(1) Whether the Examiner erred in rejecting claims 1-2, 17 and 27 under 35 USC 102(e) as anticipated by Smith.

(2) Whether the Examiner erred in rejecting claims 3-5 and 18-20 under 35 USC 103(a) as unpatentable over Smith in view of Van Heeswyk.

(3) Whether the Examiner erred in rejecting claims 8-13, 16, 21 and 22 under 35 USC 103(a) as unpatentable over Smith in view of Raleigh.

VII. GROUPING OF CLAIMS

All claims in this appeal stand or fall together.

VIII. ARGUMENTS

A. <u>The rejection of claims 1-2, 17 and 27 under 35 USC 102(e) as anticipated by Smith should be reversed</u>.

Claims 1-2, 17 and 27 have been rejected under 35 USC 102(e) as anticipated by Smith.

In the final Office Action dated October 21, 2003, the Examiner sets forth his reasons for maintaining the rejections originally set forth in the non-final Office Action dated May 1, 2003.

Specifically, the Examiner asserts, in "Response to Arguments" in paragraph 2 of the final Office Action, that Smith discloses flowcharts of two similar cases in figure 7 and figure 8. Figure 8, according to the Examiner, illustrates a protocol employed by a first base station and a second base station to communicate data there-between. Figure 7 illustrates a protocol employed by a base station and a mobile unit, which represents a user, to communication data there-between. The Examiner then continues by stating that in one case (communication between the base and mobile stations), only the base station adaptively steers the adaptive sectored antenna, whereas in a second case (communication between first and second base stations), both stations are equipped with adaptive sectored antennas. Nevertheless, the Examiner concludes that in the case of a first and second base station, the stations adaptively steer their respective arrays to achieve a minimum bit error rate (BER) and a maximum received signal strength indication (RSSI). In the case of a base and mobile station, on the other hand, the Examiner asserts that the base station obtains the BER and the RSSI, which represent the quantitative information about the mobile station. According to the Examiner, each value of the BER and the RSSI is inherently computed differently by using different signal processing algorithms, and both signal-processing algorithms represent the claimed first and second signal processing algorithms. The base station, according to the Examiner, steers its adaptive sectored antenna to meet the BER and RSSI thresholds with respect to the mobile unit. The Examiner concludes that since the quantitative values of both BER rate and RSSI are utilized to improve the quality of the transmission of the data transmission, both quantitative values inherently contain interference information of the received signals.

In the Response filed March 22, 2004, Appellant asserted that Smith fails to disclose the following features of the claimed invention: (1) obtaining quantitative information about

received user signals, (2) obtaining quantitative information about the received interference signal from the received signal and the quantitative information about the received user signal, (3) generating a directional pattern from the information about the received interference signal, and (4) generating this directional pattern for transmission.

More specifically, addressing (1): Smith does not use user signals which are not known by the receiver, but rather a training sequence known by the receiver. Therefore, Smith does not obtain quantitative information about received user signals. The Examiner has interpreted "valid data is transported between BS and MU", step 714 in figure 7, as equivalent to the user signals in the claimed invention. However, the transmission of valid data in figure 7 of Smith takes place after the method of finding the proper direction for the antennas, i.e. the "valid data", which is not known by the receiver, is not a basis for any of the steps having to do with BER, RSSI, antenna steering and so on. This implies Smith having a first phase during which no useful data is transmitted but only training sequences, and this first phase is used to find the proper antenna direction. Only after having found the proper antenna direction can the second phase during which useful data is transmitted start. In the present invention, on the other hand, the method of generating the directional pattern goes along with the transmission of useful data (i.e. the user signal). Hence, there is no "break" (like Smiths first phase) or extra training sequences required.

Addressing (2): Smith uses the BER (bit error rate) and the RSSI (received signal strength indicator). Smith does not disclose obtaining quantitative information about the received interference signal. Even if one purports that the RSSI somehow implicitly contains information about the received interference signal, this information is definitely not obtained in a way similar to the claimed invention obtains the quantitative information about the received interference

signal, namely from the received signal and the quantitative information about the received user signal. In contrast, Smith uses the training sequence to obtain the RSSI.

Addressing (3): According to the claimed invention, the information about the received interference signal is used to generate a directional pattern. The BER and RSSI are used by Smith not to generate a directional pattern, but to bring about a decision whether to change the direction of the antenna or not. This is shown in figure 3. If BER is higher than a predetermined threshold and/or RSSI is lower than a predetermined threshold, then in step 318 the antenna is steered a predetermined amount, e.g. 22.5 degrees (col. 5,1. 23-26). After having steered the antenna, the values of BER and RSSI are checked again and compared with the thresholds. This method corresponds to trial and error. The antennas direction is changed by steering the predetermined amount until BER and RSSI are satisfactory (col. 5, l. 62: "scan the antenna array"). That means that BER and RSSI are only decision parameters, whereas in the claimed invention, from the information about the received interference signal, a directional pattern can be directly obtained, e.g. by calculation which is shown by the formulas in the description.

Addressing (4): The steering process of Smith tries to guarantee that a certain signal quality for the reception of signals can be maintained (e.g. col. 7,1. 24-33, col. 9,1. 28-32, col. 10, l. 12-18, col. 10, l. 26-30, col. 10, l. 39-43). The Examiner purports that "the quantitative values of both BER rate and RSSI are utilized to improve the quality of the transmission of the data transmission," but nowhere does Smith mention steering the antennas for better transmission. The only goal is to change the antenna direction for reception.

For understanding the differences between Smith and the instant application, it should be stressed that Smith uses the training sequence known by the receiver, while the instant invention uses the user signal which is not known by the receiver. This difference automatically enforces a

different approach for finding a proper antenna direction, as of course Smith does exploit the receivers knowledge of the antenna training sequence.

In the Advisory Action mailed April 13, 2004, the Examiner addresses each of the four points above. Beginning with (1), the Examiner states that "[w]hether or not the user signals being a training sequence, known signals, 'valid data', as argued by the Applicant, have not been recited in the claim." Referring to (2), the Examiner comments that "[t]he measured two interference indication signals inherently address the claimed 'obtaining quantitative information about the received interference signal'. Applicant fails to recite in the claim how the information is obtained in a way similar to the claimed invention as argued." Referring to (3), the Examiner posits that "a directional patter is inherently generated based on the two interference indication signals. Applicant'[s] arguments on obtaining directly a direction pattern is not recited in the claim. The claims step only recites 'generating a direction pattern from the information about the received interference signal', which is anticipated by Smith et al. teachings." Finally, referring to (4), the Examiner believes that "Smith et al. discloses, in column 10, lines 39-48, the beam steering circuit enables the antenna to achieve spatial selectivity, to focus, and to converge on one of the users and reject signals from all other users in the environment. Unequivocally, Smith et al. inherently teaches steering the antenna for better transmission/reception."

Appellant respectfully maintains that Smith fails to disclose (1) obtaining quantitative information about received user signals, (2) obtaining quantitative information about the received interference signal from the received signal and the quantitative information about the received user signal, (3) generating a directional pattern from the information about the received interference signal, and (4) generating this directional pattern for transmission. In addition to the arguments presented above, Appellant further addresses the Examiner's statements found in the

Advisory Action. Referring to claim limitation (2) above, the information about the interference signal is not only obtained from the received signal, but additionally from the information about the received user signals. However, the Examiner (in the first paragraph on page 2 of the Advisory Action) appears to state that in Smith, the RSSI can be regarded as information about the received user signals. This belief is also stated in paragraph 2 on page 2 of the Advisory Action. Notably, the Examiner also states that the BER and RSSI are information about the received interference signal. Hence, the Examiner is asserting that RSSI is both information about the received user signals and information about the received interference signals. If this holds true, it would not be possible to obtain information about the received interference signal from (the received signal and) the information about the received user signals as required by claim 1 of the instant invention.

Turning to claim limitation (4) above, this limitation requires a method for obtaining information about user signals and interference signals and for generating a directional pattern for transmission at the receiver. Hence, the receiver obtains the directional pattern by evaluating signals received thereby, whereas the directional pattern generated is meant to be used for transmission by the receiver (which is independent from reception). The portion of Smith used by the Examiner to anticipate the claimed invention, namely column 10, lines 39-48, only refers to reception of signals, not transmission. This is rendered clear by the statement "converge on one of the users and reject signals from all other users in the environment." Signals from other users can only be rejected while receiving signals and not while transmitting signals.

Finally, referring to limitation (1) above, Appellant reiterates that the term "user signals" as used in the claims are understood by the skilled artisan as meaning signals which represent data useful for the end user of the communication device(s) in use. This meaning excludes

steering or control signals which are not meant to be transmitted to the end user, but are only necessary for assuring functionality of the communication. Training sequences fall into this category- control or steering signals. That is, an antenna training sequence is a sequence known to the receiving device and it assures functioning of the communication, but it is not passed on to the end user. Hence, the training sequence can not be regarded as a user signal.

Claims 2 and 17 are allowable at least due to their dependency from claim 1. Claim 27 recites the same features discussed above in connection with claim 1, and are therefore allowable for the reasons set forth above. Accordingly, the rejection should be withdrawn.

B. <u>The rejection of claims 3-5 and 18-20 under 35 USC 103(a) as unpatentable over Smith in view of Van Heeswyk should be reversed</u>.

Claims 3-5 and 18-20 are allowable at least due to their dependency from claim 1, and since Van Heeswyk also fails to disclose these features. Accordingly, the rejection should be withdrawn.

C. <u>The rejection of claims 8-13, 16, 21 and 22 under 35 USC 103(a) as unpatentable over Smith in view of Raleigh should be reversed</u>.

Claims 8-13, 16, 21 and 22 are allowable at least due to their dependency from claim 1, and since Raleigh also fails to disclose these features. Accordingly, the rejection should be withdrawn.

<u>CONCLUSION</u>

For the foregoing reasons, Appellants submit that the pending rejections should be reversed.

In the event that the transmittal letter is separated from this document and the Patent and Trademark Office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952,** referencing docket number **449122009400**. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

Respectfully submitted,

Dated: June 21, 2004

By: Kevin R. Spivak
Registration No.: 43,148
MORRISON & FOERSTER LLP
2000 Pennsylvania Avenue, N.W.
Washington, D.C. 20006-1888
Telephone: (202) 887-1500
Facsimile: (202) 887-0763

Appendix

1. A method for the wireless data transmission using at least one transmitter and at least one receiver, the receiver having one or more receiving antennas comprising:

utilizing information on received interference signals to improve the quality of transmission of the data transmission;

obtaining quantitative information about received user signals from the received signals of one of the antennas by using a first signal processing algorithm; and

obtaining quantitative information about the received interference signals from the received signals of one of the antennas and the quantitative information obtained about the received user signals by using a second signal processing algorithm wherein the quantitative information about the received interference signals is used to generate a directional pattern for transmission at the receiver.

2. The method as claimed in claim 1, wherein the first signal processing algorithm provides an estimate of the transmitted user data.

3. The method as claimed in claim 1, wherein the first signal processing algorithm provides an estimate of the characteristics of the radio channels operating between the transmitters and the receiver.

4. The method as claimed in claim 1, wherein the second signal processing algorithm includes algorithms to reconstruct the user signals received from the receiving antennas by the quantitative information obtained about the signals.

5. The method as claimed in claim 1, wherein the second signal processing algorithm includes a weighted or unweighted subtraction of the reconstructed received user signals from the total received signals.

6-7. (Canceled)

8. The method as claimed in claim 1, wherein the second signal processing algorithm includes a forming of the spatial covariance matrix of the received interference signals.

9. The method as claimed in claim 1, wherein the second signal processing algorithm includes a forming of the temporal covariance functions of the received interference signals at each of the antennas.

10. The method as claimed in claim 1, wherein the second signal processing algorithm includes a forming of the total covariance functions of the received interference signals.

11. The method as claimed in claim 1, wherein the second signal processing algorithm includes an estimating of the spatial, temporal and/or total covariance functions by finite temporal averaging over the received interference signals.

12. The method as claimed in claim 1, wherein the second signal processing algorithm includes an estimating of the directions of incidence of the interference.

13. The method as claimed in claim 1, wherein the second signal processing algorithm includes an estimating of the power and/or the spectral shape of the interference.

14-15. (Canceled).

16. The method as claimed in claim 1, wherein the first signal processing algorithm includes a forming of the spatial covariance matrix of the received user signals.

17. The method as claimed in claim 1, wherein the first signal processing algorithm is based on the principle of a single user detection in the case of data transmission.

18. The method as claimed in claim 1, wherein the first signal processing algorithm is based on a principle of multi-user detection in the case of data transmission.

19. The method as claimed in claim 1, wherein the first signal processing algorithm is based on a principle of a rake receiver in the case of data transmission.

20. The method as claimed in claim 1, wherein the first signal processing algorithm includes forward error correction decoding at the receiver end during data transmission.

21. The method as claimed in claim 1, wherein the first signal processing algorithm is based on a principle of the zero-forcing algorithm.

22. The method as claimed in claim 1, wherein the first signal processing algorithm is based on a principle of maximum-likelihood estimation or minimum mean square error estimation.

23-26. (Canceled)

27. A system for wireless data transmission, comprising:

a receiver having one or more receiving antennas utilizing information on received interference signals to improve the quality of transmission of the data transmission, wherein

quantitative information is obtained about received user signals from the received signals of one of the antennas by using a first signal processing algorithm, and

the quantitative information about the received interference signals is obtained from the received signals of one of the antennas and the quantitative information obtained about the received user signals by using a second signal processing algorithm wherein the quantitative information about the received interference signals is used for generating a directional pattern at the transmitter; and

a transmitter to generate a directional pattern based on the quantitative information about the received interference signals.